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Arizona Zone
Entomology &
Pathology

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Subject: Prevention of Ips caused pine mortality in association with the
Badger Knoll thinning project, Apache-Sitgreaves NF, Springerville
Ranger District

To: District Ranger, Springerville RD

On January 28th, 1997 I received a call from Kelly Castillo, Fuels Specialist, Springerville RD concerning timing of thinning treatments planned for the Badger Knoll project. Specifically Kelly was requesting advice and recommendations concerning whether or not timing restrictions designed to prevent Ips caused tree mortality could be relaxed for this project, allowing thinning to occur prior to July (starting in May). This letter summarizes my suggestions concerning this issue for the Badger Knoll project. I should also mention that I have visited the treatment area numerous times with district personnel at their request. Most recently we discussed the area and the proposed treatment in our recent regional training session concerning Identification, Management and Effects of Insects and Pathogens in the Southwest. Also enclosed is an appendix describing in greater detail concepts related to the biology, effects and management of Ips beetles in the Southwest.

Background.

In the past the District has used a contract clause restricting thinning to the period between July and December in order to reduce the risk of Ips related mortality to residual trees in and adjacent to thinned areas. I am not aware if the clause has been utilized for all projects or some. My understanding is that use of the clause began after several episodes where extensive Ips caused mortality occurred in association with thinning projects. This particular case involves the Badger Knoll thinning project, a 60 acre project in which material between 1 and 9 inches in diameter will be cut. Badger Knoll is also a special case because it is located in the urban interface.

Ips spp. are a type of pine bark beetle which prefer to infest fresh pine debris such as logging or thinning slash but in some circumstances can cause considerable mortality to living pines. Most often this mortality occurs in association with drought and with predisposing stand conditions such as high density, presence of diseases such as dwarf mistletoe, and with poor site conditions such as thin rocky soils. Frequently outbreaks occur in association with logging or thinning operations during drought years.

Use of timing restrictions to reduce risk of Ips caused tree mortality has been recommended by professionals in Forest Health Protection throughout the west. These involve avoiding, when possible, slash creation during the months of January through June. However, in making management decisions concerning timing of treatments one must consider a broad range of issues related to thinning and slash management. There are a number of timing restrictions that have been

recommended for protection of wildlife species for example. There can also be economic issues related to restricting timing. This has left resource managers in a tough position, trying to accomplish worthy projects, which I might add will in the long run reduce stand susceptibility to Ips as well as other pine bark beetles, while doing the right thing from a broad resource management perspective.

Suggestions.

The potential for Ips caused mortality in association with the proposed thinning project will be directly related to the moisture levels this winter and spring. If precipitation levels are 75 percent or less of normal through this spring the potential for Ips related mortality will be high. If normal or above normal precipitation occurs, the potential for mortality will be low. To me the best way handle this situation would be to go ahead with thinning prior to July, if moisture levels are good. However, if another drought ensues it would be best to wait until July or after. Ideally one would want to have some flexibility so that if in May we are in the midst of another drought we could postpone treatments until after July. The Alpine Ranger District was also considering this same question and they have put together a contract clause which describes this. I enclosed that as appendix 2.

If the decision is made to harvest starting in May, we would suggest implementing some additional slash management practices to further reduce risk of Ips related mortality within the project area and on adjacent Forest Service and private lands. Lopping and scattering slash in openings is a fairly effective tool for reducing slash suitability to Ips. This practice exposes slash to the sun, causing heating and promoting drying. In such cases usually only the undersides of the slash pieces become infested by Ips. A Cooperative study conducted jointly by our group, NAU and the San Carlos tribe further indicated that slash placed under residual canopies of 60 sq ft received many fewer attacks than under denser stands (120 sq. feet and greater). Fresh slash that is unlopped, piled or left under a shaded canopy is most suitable for the beetles. Slash could, however, be piled at a later date, if desired, for purposes of burning. I would suggest delaying piling until fall or later.

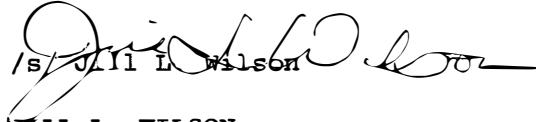
Kelly inquired about covering slash piles with plastic as a way to prevent Ips attack. I wanted to reiterate that this practice is intended as a suppression tactic for infested slash and has not been tested as a preventive method. Further the way I've commonly seen plastic applied in the field, which involves draping black plastic over piles to promote drying, would probably exacerbate the Ips problem as it creates a more shaded environment. When used as a suppression tactic, infested slash is piled and then covered with heavy clear plastic. Edges of the plastic are buried so that tight seal is created. Developing brood are killed by high temperatures. This would be an appropriate method to use if slash becomes infested and there concern about Ips moving into adjacent living trees.

Other mitigation methods aim to remove host material and include such practices as chipping, burying, and hauling away material. These practices are often not very cost effective however. In some areas in the Region, such as the Prescott National Forest, another contract clause is used which requires purchasers to remove bole material down to a 4 inch top. This latter clause is used in commercial timber sales, of course, and may not be relevant to the current case.

District Ranger, Springerville Ranger District

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If you require further assistance in this matter please feel free to contact me at J.Wilson:S28L02A or give me a call at (520) 556-2074.


/s/ J. L. Wilson

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APPENDIX 1

TECHNICAL INFO CONCERNING Pine Engravers

Several species of pine engraver beetles, Ips spp., attack downed and standing ponderosa pine in the southwest. The beetles usually produce 2 - 4 generations per year depending on climate and elevation (Parker 1979, Sartwell et al 1971). Flight and attacks usually begin in April or May, whenever daily maximum temperatures reach 60 - 70 degrees F. (Livingston 1979) and continue until the onset of cold weather. Engraver beetle attacks are initiated by adult males. The attack process is mediated by pheromones released by the beetles in combination with host terpenes. The male is joined by one to many females. After mating each female constructs an egg gallery in the inner bark, slightly scoring the wood surface. Egg galleries are not packed with boring dust, this distinguishes them from the Dendroctonus spp., such as the western pine beetle. Eggs are laid on each side of the gallery. Larvae feed in mines that run laterally from the egg gallery. The larval mines are packed with frass. Pupation occurs in an oval cell chewed by the larva. In the southwest this cycle varies in length from about one month in mid summer to eighty days at other times (Parker 1979).

External evidence of attack consists of accumulations of reddish brown boring dust in bark crevices and at the base of the tree, small entrance holes, and occasionally pitch tubes on living trees. When the bark is removed from infested trees, the galleries can be seen in the inner bark or on the surface of the sapwood.

These insects prefer to attack freshly cut slash, windthrow and snow broken material (Livingston 1979). Standing green trees may also be attacked, but often only the tops are killed on large trees. The minimum diameter of attack is around 4 inches. A number of factors may increase the risk of pine engraver mortality including:

1. Presence of green slash or snow broken material in spring (January - June) (Livingston 1979, Parker 1979),
2. Spring drought (less than 75 percent of normal precipitation) (Livingston 1979),
3. Stagnated stand conditions, particularly high density pole-sized stands (Livingston 1979),
4. Diseases such as dwarf mistletoe (Parker 1979).

Over 80 percent of outbreaks are primarily associated with slash or weakened trees created during forest management operations (Parker 1979). The most extensive outbreaks occur when fresh slash or weakened trees are present in the same area for two or more consecutive years.

The effects of engraver beetle attack include tree mortality and top kill. Trees that have been topkilled are often attacked by Dendroctonus spp., such as the western pine beetle, roundheaded pine beetle, or red turpentine beetle, in the lower bole within the same year or subsequent years. Overall effects of mortality are the same as with other bark beetles.

Preventive measures are most effective in reducing losses. The following tactics are recommended for this purpose. Many of these are described in the Cutting Methods Handbook (2409.26a, chapter 62).

1. Where the threat of Ips caused mortality is a concern, slash creating activities should be conducted from July - December. Minimize creation of slash during the months of January - June.
2. When it is impractical to do this, slash should be treated so as to make it less suitable for the beetles. This may include chipping or crushing. The handbook also mentions burning however it has been our experience that burning is not accomplished until many months after the slash is created, by which time the beetles have already emerged, so this method may not be practical. Exposing as much of the slash to the sun as possible will reduce brood production. In some situations, a lop and scatter treatment to promote drying may be sufficient. Brood production has been shown to be greatest in piled slash and unlopped tops in California.
3. Avoid management activities that create slash or weakened trees for two or more consecutive years in the same area or adjacent areas. We recommend separating activities by 2 miles or more.
4. Maintain or improve stand vigor through precommercial and commercial thinning.
5. Utilize harvested material to a 4 inch top (diameter outside bark). Few beetles are produced in debris below 4 inches in diameter because of the limited amount of food reserve in the inner bark.
6. Monitor green slash and standing trees for evidence of infestation, particularly during April - July in drought years, should large numbers of Ips be detected, a pest management specialist can be consulted.

LITERATURE CITED

- Livingston, R.L. 1979. The Pine Engraver, *Ips pini* (Say), in Idaho, Life History, Habits, and Management Recommendations. Idaho Dept. of Lands, Report 79-3, 7 p.
- Parker, D.L. 1979. Arizona Five-Spined Ips, *Ips lecontei* Swaine, in Ponderosa Pine. USDA Forest Service, Southwestern Region, Forest Insect and Disease Management Report R-3 79-12, 17 P.
- Sartwell, C., R.F. Schmitz, and W.J. Buckhorn. 1971. Pine Engraver, *Ips pini*, in the Western States. USDA Forest Service, Forest Pest Leaflet 122. 5p.

APPENDIX 2

IPS BEETLE TIMING CLAUSE

Source: Alpine Ranger District

Contract clause CT 6.314# "Timing of Logging Operation" would be included in the timber sale contract to limit cutting and fresh slash creation activities during Ips spp. beetle brood season. These activities will be prohibited between December 15 through May 15 to prevent Ips outbreak across the sale area. The May 15 date will be subject to change, as seasonally dictated by spring weather and/or site-specific conditions, and may possibly be extended to July 15 in some locations.